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DEVICE AND METHOD FOR SEARCHING AND PROCESSING OF DATA IN A MASS STORAGE

PRIORITY INFORMATION

This patent application claims priority from International patent application PCT/EP2004/003225 filed March 26, 2004, German patent application 103 14 376.9 filed March 28, 2003, and German patent application 103 39 185.1 filed August 26, 2003, which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

The invention relates in general to data storage and retrieval techniques and in particular to a device and a method for searching and processing of data in a mass storage device.

Search engines are known for use with the Internet in which after one enters a search term, the pages corresponding to the search term are listed from among a large number of Internet pages. Such searching within a large quantity of data not normally assembled manually by a single person is typically necessary to locate the desired information, since it is not practical to search through the entire quantity of data by hand.

Furthermore, known devices having a sufficiently large hard disk can save relatively large quantities of audio and video transmissions or text files. For example, one can store about 1000 music files on a hard disk with a storage capacity 5 GB. Meanwhile, hard disks with a storage capacity of 100 GB are known. In the foreseeable future, the storage capacity of hard disks may increase by several orders of magnitude. To find desired data on hard disks with capacities of such orders of magnitude, one typically utilizes various search engines. However, it

is desirable for a user to carry such devices in a mobile manner.

Thus, such devices should be as relatively small, lightweight, easy to use and readily accessible as possible. Yet, use of such devices is often complicated. For example, palmtops are known, which basically comprise miniaturized laptop computers. Despite their small size, palmtops typically have to be placed on a surface for proper operation. To enter text as fast as possible, the keyboard is generally operated with both hands. Thus, oftentimes the device cannot be grasped firmly and is relatively unstable in its positioning. Additional problems are caused by the miniaturized keyboard, since the user often undesirably depresses several keys at the same time with one finger.

Moreover, devices are known having a keyboard whose keys are typed with a stylus. The keyboard and its space requirement on such a device are thus reduced, but the handling may not be simplified since a keyboard entry may typically require both hands.

A keyboard with a relatively smaller number of keys is known from mobile or wireless telephones. Here each key may be assigned several meanings. In this way, single-hand operation of a device becomes possible. However, the handling of the device itself may be more difficult, since oftentimes it may not be immediately evident how to select the different meanings of the keys. In particular, to operate the device without error, the device reports back the meaning assigned to the last key stroke. To achieve this, such devices generally require a screen, which needs to be as large as possible so that what is displayed on the screen is easily legible.

Besides entry by key typing, voice entry is also known, but this can lead to incorrect results if for example, one does not speak clearly. There also exists character recognition of text written by hand on a screen, but this can also produce incorrect results if the writing is shaky.

A single-key operation is known from the computer mouse. However, this operation is

usually coupled with a two-dimensional motion of the mouse, for which a smooth surface is required. Furthermore, typically a large screen is necessary to properly display the different menu items on the screen without viewing problems. The text may become illegible on smaller screens.

A Morse key enables text to be entered using a single key switch. In most instances, Morse keying is used for wireless transmission of text from a sender to a remote receiver. U.S. Patent 6,418,323 discloses a mobile telephone that is fitted with a Morse key so that one can hold private telephone conversations even in public by relaying the desired text via Morse code to the user of a second mobile telephone. A setting up and testing of the operating module of an electronically controllable device by a Morse key is known from German patent application DE 197 56 042 A1. Here, the device being tested issues on demand the current sending or receiving frequency, for example, by Morse code.

What is needed is a technique that simplifies the searching and processing of data in a mass storage.

SUMMARY OF THE INVENTION

A device for searching and processing of data in a mass storage device includes a housing with an acoustic and/or optical output unit. A key unit on the housing allows for entry of Morse code or Morse-like symbols in two input modes. A first input mode facilitates the entry of text and the second input mode facilitates the entry of control commands. Through use of Morse code or Morse-like symbols for the entry of text, the number of required keys is significantly reduced. This represents a substantial space savings as compared to a typical keyboard for text entry. Since two entry modes are used during the searching and processing of data (i.e., the entry of the

actual text and the entry of control commands), the separation of these two different types of inputs into two entry modes reduces uncertainty as to which entry mode the device is using. The key unit may comprise two separate keys, one key facilitating the entry of text and the second key the entry of control commands. Thus, for example a user of the device can distinguish whether the term "execution" means to search within data or whether this term is an instruction to perform a search.

Also, the entry of control commands by Morse code or Morse-like symbols allows normal speech to be used as command words, thus code words are not required. By "Morse-like symbols" is also meant different relations between short and long key operations including those prescribed by Morse code, and a different rhythmic translation of the alphabet into sequences of long and short key operations or sequences of light and firm key pressures.

To operate the device for searching and processing of data in a mass storage device with a single key, both keys within the key unit may be located in one element, for example, a wheel. The wheel can lock into two positions, for example a sliding controller that can be moved into two positions, or a rocker that can be flipped into two positions. The element can be operated in both positions as a key unit for entry of Morse-like symbols. As an alternative, both key functions may be combined in a single key unit whereby one can switch between the two entry modes by a particular Morse code or Morse-like symbol. The key unit can be fitted with a flipping, sliding, or turning function to enable a switching between the two entry modes.

The text entered by the first key may comprise search terms that define the data search. Search terms refers not only to complete words, but also to individual letters or syllables or combinations of letters that occur in the sequence in the search term, such as for example all of the consonants. Also, however, the entering of messages, addresses, correspondence, passwords,

or other written text, which desirably is to be taken up without interpretation by the mass storage, may occur by Morse codes or Morse-like symbols via the first key. When entering combinations of letters from different words, which are joined by "and," for example, one may define a blank symbol to coordinate the letters with the different words, for example, using a relatively long pause or a special symbol. A blank symbol may define a linking of the terms or sequences of letters with "and" in the search mode.

Each of the two keys may be located on each of a corresponding one of the two long sides of the housing. This allows for operation of the first key with the thumb and the second key with the index finger, while the housing can be held in the palm. This typically allows the view of a screen to remain unobstructed. Such an arrangement of the two keys allows both right- and left-handed persons to operate the device.

The output unit may comprise, for example, a light-emitting diode (LED), an integrated loudspeaker, or a connection for a headphone. A device for acoustic output of information regarding search results offers the advantage of stating the number of results found, to inform the user relatively quickly whether the search may perhaps be limited by additional search terms. The mechanical output unit can be an additional key unit. Alternatively, one of the two keys for entry of search terms or commands may comprise the output unit. As such, the key may move under electronic control at the rhythm of Morse code or Morse-like symbols, and a user can feel the movement. Such an output unit is generally noise-free and can also be used when talking to others without being disturbed by acoustic output from the device or looking at the screen or the LEDs. A screen may be used as the output device, since this enables a quick glance at the text.

A screen or separate screens may be arranged on both the front and back side of the housing. This way, it may be possible to display larger portions of result lists. The screens can

also be assigned different functions, e.g., the display of two different searches or the display of a search result on one screen and a written text on the second screen. Also a second screen, allows several people to view the screen at the same time, for example, to view picture files such as digital photos. If the photo is displayed on both screens at the same time, several people can look at the screen from different positions.

A wheel may additionally be located on the housing for moving the screen contents. This facilitates the reading of the search results or the scrolling in written text.

The text of the search terms entered by Morse code or Morse-like symbols may be visible on the screen in the top line. As such, the user has direct control over the symbols entered, making possible a correction if necessary.

The mass storage device may be arranged in a portable storage device. An entry by a Morse key allows for space-saving for portable devices, which generally are designed to be as small and easy to use as possible. Through the entry of text and control commands by a single key unit, a portable device need not be placed on a surface for use.

The entire list or some portion of the available data may be displayed on the screen for example at device startup. The entry of a single letter as the search term may alter the sequence of data in the list. As such, often the mere entering of a letter, syllable or a sequence of letters occurring in that sequence in the search term, or all the occurring consonants of the search term, may be enough to filter out the desired data, thereby saving time. The control commands can be entered in any given language. If the individual actions of the device are associated with certain terms, the entering of terms such as "enter," "execute" or "execution" will initiate a search. Thus, the control commands can be entered relatively unambiguously.

Rhythms can be entered as search terms, corresponding for example not to any text or letters but rather to a melody of a particular song. This facilitates the searching for particular music titles when the user knows only the melody, but not the particular title of a music file.

Furthermore, passwords can be entered as text, which may comprise a rhythm. This protects against unauthorized access to password-protected files, since such passwords are generally not listed in any dictionary or lexicon.

The user can be identified by a pattern of Morse code or Morse-like symbols.

Morse code or Morse-like symbols may be entered in at least one entry mode designed for entry of text via a key unit. Search terms may be entered to carry out a search in one entry mode. At the start of the search the entire or some portion of the list of data present on the mass storage may be indicated on a screen. The entry of for example one letter as the search term may correspondingly alter the sequence of data in the list or may hide those data not corresponding to the search term. Oftentimes it may suffice to enter one syllable or one sequence of letters occurring in that sequence in the search term, or all the consonants occurring in the search term, to filter out the unwanted data.

The search method may require a single entry mode. As such, the key unit may comprise a single key. However, additional entry modes can be provided on the key unit for other operations by the device (e.g., for entry of control commands). Also, more than two entry modes may be provided (e.g., for simultaneous performance of several searches or entry of control commands on different levels), for which the key unit may also have more than two keys and/or a key with more than two operating positions.

These and other objects, features and advantages of the present invention will become more apparent in light of the following detailed description of preferred embodiments thereof, as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an embodiment of a portable storage device; and

FIG. 2 is a perspective view of another embodiment of a portable storage device.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, a portable storage device includes a housing 10 in which a mass storage device is arranged. A relatively large quantity of data, such as music files, video files, photos and text files, may be saved in the mass storage device. On each of two long sides 14 and 16 of the housing 10, a corresponding left key 20 and a right key 22 are located. The keys 20 and 22 can be operated with the thumb and index finger of one hand, when the housing 10 lies with its front side 12 or back side 18 in the palm of the user's hand.

The keys 20 and 22 may comprise Morse keys. The left key 20 may be used to enter text, such as search terms or key words for a text being processed. The right key 22 may be used to enter control commands for the mass storage.

On the front side 12 and the back side 18 of the housing 10 is arranged a screen or pair of screens 30, extending for example over nearly the entire surface of the front side 12 and the back side 18.

On one of the two long sides 14 and 16 of the housing 10 is arranged a wheel 24, by which the content displayed on the screens 30 can be moved. In FIG. 1, the wheel 24 is located

on the right side 16 of the housing 10. Also located on the right side 16 is a socket 26 for connection to, for example, a headphone. If no separate button turns the device on and off, the user can turn on the device by typing the word "on" using the right key 22. The user can then, for example, scroll through the available music files by titles, for example, those of the Beatles. To do this, the user may use the right key 22 to type the words "search music pieces." On the screen 30 appears a list of stored music files. If several identical devices are within range of the device currently in use, a wireless interface may be used to exchange data between the several devices such that available data within one device is displayed in the list of the other devices. Such available data from the other devices may be marked in the list. This way, the user can copy the corresponding data onto the hard disk of the user's device.

With the left key 20, the user may enter the sequence of letters "BEA." Alternatively, the user may enter another term such as "Beatles," "BTLS" or "BTS." Once entered, the sequence "BEA" may appear in the top line of the screen 30. The music files are searched to find the sequence of letters "BEA," whether in the title, name of performer, or in some other information about the music files. Since the sequence of letters "BEA" occurs in the word "Beatles," the titles of the music files of the Beatles and possibly other titles may then be placed at the top of the list of available music files. The user may then hear through the headphone, for example, the announcement "25" and from that knows that a total of 25 titles of music files have been found in the mass storage having the combination of letters "BEA." The two entry keys 20, 22 can also be used as mechanical output devices, since the keys 20, 22 may move in a rhythm while the user lightly places his finger on the keys 20, 22 to feel the movement of the keys.

By using the wheel 24, the user can select a desired music file to listen to from the list of results. Once the desired title is selected, the user can start playing the music file by typing the

term "play" using the right key 22.

While the desired music file is playing, the user for example may view photos. For this, the user may use the right key 22 to type "search photos." With the left key 20, the user may enter "vacation 2000" as the search term, and then receive a list of corresponding picture files. Using the wheel 24, the user can select a particular one of the photos and, after entering a term such as "view" or "enter" with the right key 22, the desired picture appears on the screen 30. The wheel 24 can also be provided with a "print" function to enable the user to send the desired picture to a printer for printing.

The desired photo may be displayed on both the front and rear screens 30, so that a person sitting opposite the user can also view the photo. After the music file stops playing, the user may desire to listen to a music file the melody of which the user is familiar with but is unfamiliar with the title or performer. Using the right key 22, the user may enter "search music rhythms" and then uses the left key 20 to enter the rhythm of the melody of the music file. The list of results may show for example two hits, the first of which the user may select by entering "play" with the right key 22.

To make the portable storage device unusable by third parties if lost or stolen, the device may require the user to enter a password after the device is turned on. The passwords may be entered using the left key 20 and may comprise either Morse code or Morse-like symbols, a combination of letters and/or numbers, or a rhythm from a piece of music. Since the Morse characteristics of different users can have substantial deviations, the device may be able to recognize the user by a pattern of Morse code or Morse-like symbols. This offers an additional protection when the device is lost or stolen, since another user with a different Morse characteristic than the authorized user will not be able to use the device, even when entering the

correct password.

Protection by a code or password which can be entered by Morse code or Morse-like symbols via a single key saves space, so that it can be used not only for small portable mass storages, but also generally for small portable devices not having any key pad, such as cameras or video cameras.

Referring to FIG. 2, a portable storage device includes a housing 40 in which a mass storage device is arranged. The mass storage device may store a relatively large quantity of data, such as music files, video files, photos, and text files. On one of the two long left and right sides 44 and 46 of the housing 40 (in this case the right side 46), a key 50 is provided. The key 50 may be easily operated with the thumb or index finger of one hand when the housing 40 lies with its back side 48 or front side 42 in the palm of the user's hand.

The key 50 may be a Morse key, and as such the key 50 may be used to enter text such as search terms or key words for text being processed when performing a search. On both the front side 42 and the back side 48 of the housing 40 is arranged a screen 60 that may extend, for example, over nearly the entire surface of the front side 42 and the back side 48. A wheel 54 may be located on either the left side 44 or the right side 46. In FIG. 2, the wheel 54 is on the right side 46. Through use of wheel 54, the content of the screens 60 can be moved. Furthermore, a socket 56 may be located on the right side 46 for connection to a headphone.

In using the device, the user may search through the available music files in the mass storage device by searching for Beatles titles. The list of the relevant stored music files may then appear on the screen 60. Using the key 50, the user may first enter by Morse code or Morse-like symbols the letter "B." On the first line of the screen 60, the letter "B" appears. The list presented on the screen may change in that the music files whose title, performer, or other

information contains a "B" are moved to the top of the list, while the music files whose title, performer or other information does not contain a "B" are moved farther down the list. Alternatively, the music files whose title, performer, or other information does not contain a "B" may be hidden from the list. This way, the list may become shorter with each further entry of additional letters or search terms as the list of relevant number of music files becomes smaller.

It may be that in a large number of situations, the selection of saved data by entering a single letter will not suffice to locate the desired stored files, in particular when several hundred or thousand music files are saved in the mass storage device. However, by using the wheel 54, the screen contents can be shifted so that even relatively long lists of search results can be scrolled through relatively quickly.

Using the key 50, the user may also enter the letters "E" and "A," so that the sequence of letters "BEA" now appears in the first line of the screen 60. Alternatively, the user may also enter, for example, "Beatles," "BTLS" or "BTS." The music files are searched and sorted to determine whether the sequence of letters "BEA" is located in the title, performer, or in some other information about the music files. Since this sequence of letters occurs in the word "Beatles," the titles of the music files of the Beatles and possibly other titles will be listed at the top of the list of available music files. The user may hear through the headphone the announcement "25" and from that knows that a total of 25 titles have been found containing the combination of letters "BEA." The entry key 50 can also be used as a mechanical output device, since the key 50 may move in a rhythm while the user lightly places his finger on the key 50 to feel the movement of the key.

By using the wheel 24, the user can select a music file to listen to from the list of results. For this, the wheel 24 may have a print function that realizes the "enter" function.

The entry of commands can be done via a second Morse key as described hereinabove, or by any known control device utilizing keys, such as a key pad similar to familiar mobile telephone key pads.

In addition, another key (not shown in FIG. 2) may be used in another entry mode to enter Morse code or Morse-like symbols for simultaneous performance and display of a second search on the screen 60 located on the back side 48 of the housing 40. It may be possible to combine either the keys for entry of Morse code or Morse-like symbols or all of the keys into a key unit. The key unit may comprise a wheel that locks in a number of positions corresponding to the number of entry modes. In each position a user can enter Morse code or Morse-like symbols. Furthermore, the key unit may comprise a turning knob or sliding controller that locks into several positions. In each position a user can enter Morse code or Morse-like symbols. It may be possible to enter several entry modes in one locked position where the user can switch between the different entry modes, for example, by typing in a certain code. Furthermore, the key unit can have one or two keys for entry of Morse code or Morse-like symbols to perform the search on one or two screens and a key pad similar to mobile telephone key pads.

Since the Morse characteristics of different users can have substantial deviations, the device may recognize the user by the pattern of Morse code or Morse-like symbols. This offers additional protection when the device is lost or stolen, since another user with a different Morse characteristic than the authorized user will not be able to use the device.

Although the present invention has been illustrated and described with respect to several preferred embodiments thereof, various changes, omissions and additions to the form and detail thereof, may be made therein, without departing from the spirit and scope of the invention.

What is claimed is: